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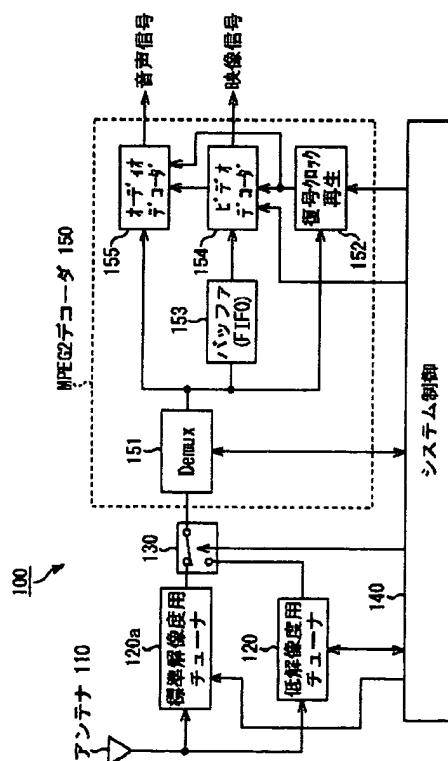
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(54)【発明の名称】 テレビジョン放送受信装置、テレビジョン放送受信システム、テレビジョン放送受信方法、及び記憶媒体

(57)【要約】

【課題】 チャンネル切替に伴い発生する出力映像信号のフリーズ(停止)状態を軽減し、チャンネル切替時であっても、ユーザにとって違和感の少ない映像を提供できるテレビジョン放送受信装置を提供する。

【解決手段】 第1のチャンネル切替手段120aでのチャンネル切替(第1のチャンネルから第2のチャンネルへの切替)が発生すると、制御手段140は、当該チャンネル切替が完了するまでの期間、第2のチャンネル切替手段120bへ第2のチャンネルの受信を行わせると共に、選択出力手段130へ第2のチャンネル切替手段120bの出力を選択させる。



【特許請求の範囲】

【請求項 1】 同一チャンネルデータ中に少なくとも第 1 の解像度の映像データ及び第 2 の解像度の映像データを含むテレビジョン放送の搬送波を受信するテレビジョン放送受信装置であって、  
受信チャンネルの切り替えを行って上記第 1 の解像度の映像データを含む任意のチャンネルのデータを出力する第 1 のチャンネル切替手段と、  
受信チャンネルの切り替えを行って上記第 2 の解像度の映像データを含む任意のチャンネルのデータを出力する第 2 のチャンネル切替手段と、  
上記第 1 のチャンネル切替手段及び上記第 2 のチャンネル切替手段の各出力の何れかを選択して出力する選択出力手段と、  
上記選択出力手段から出力されたデータに含まれる映像データを当該映像データの解像度に基づき再生する再生手段と、  
上記第 1 のチャンネル切替手段での受信チャンネルが第 1 のチャンネルであり、上記選択出力手段にて上記第 1 のチャンネル切替手段の出力が選択されている状態で、  
上記第 1 のチャンネル切替手段での上記第 1 のチャンネルの受信状態から第 2 のチャンネルの受信状態へのチャンネル切替が発生した場合、当該チャンネル切替が完了するまでの期間、上記第 2 のチャンネル切替手段へ上記第 2 のチャンネルの受信を行わせると共に、上記選択出力手段へ上記第 2 のチャンネル切替手段の出力を選択させる制御手段とを備えることを特徴とするテレビジョン放送受信装置。

【請求項 2】 上記制御手段は、上記第 2 のチャンネル切替手段での上記第 2 のチャンネル切替完了後、上記第 1 のチャンネル切替手段へ上記第 2 のチャンネルへのチャンネル切替を行わせ、当該チャンネル切替完了後、上記選択出力手段へ上記第 1 のチャンネル切替手段の出力を選択させることを特徴とする請求項 1 記載のテレビジョン放送受信装置。

【請求項 3】 上記第 1 の解像度は、標準解像度を含み、

上記第 2 の解像度は、低解像度を含むことを特徴とする請求項 1 記載のテレビジョン放送受信装置。

【請求項 4】 同一チャンネルを、標準解像度と低解像度の異なる各映像データで、且つそれぞれ異なる変調方式で同時に送出するデジタルテレビジョン放送の受信に対応したテレビジョン放送受信装置であって、  
任意のチャンネルの搬送波を選択及び復調して、上記標準解像度の映像データを含むチャンネルデータを出力する第 1 のチューナと、  
任意のチャンネルの搬送波を選択及び復調して、上記低解像度の映像データを含むチャンネルデータを出力する第 2 のチューナと、  
上記第 1 のチューナの出力データと、上記第 2 のチュー

ナの出力データとを択一的に選択するスイッチと、  
上記スイッチにより選択されたデータに含まれる映像データを当該映像データの解像度に応じてデコードするデコーダ部と、

上記第 1 のチューナにおける第 1 のチャンネルの受信状態から第 2 のチャンネルの受信状態へのチャンネル切替が発生した際に、上記第 2 のチューナで第 2 のチャンネルの選択及び復調を行い、上記スイッチで上記第 2 のチューナの出力の選択を行い、上記デコーダ部での復号解像度を上記第 2 のチューナから出力されるデータの映像データの解像度へ設定し、上記第 1 のチューナで第 2 のチャンネルの選択及び復調を行い、上記スイッチで上記第 1 のチューナの出力の選択を行い、上記デコーダ部での復号解像度を上記第 1 のチューナから出力されるデータの映像データの解像度へ戻す制御手段を備えることを特徴とするテレビジョン放送受信装置。

【請求項 5】 上記チャンネルデータは、MPEG 符号化方式に従ったデータを含むことを特徴とする請求項 1 又は 4 記載のテレビジョン放送受信装置。

【請求項 6】 複数の機器が互いに通信可能に接続されてなるテレビジョン放送受信システムであって、  
上記複数の機器のうち少なくとも 1 つの機器は、請求項 1 ～ 5 の何れかに記載のテレビジョン放送受信装置の機能を有することを特徴とするテレビジョン放送受信システム。

【請求項 7】 同一チャンネルデータ中に少なくとも第 1 の解像度の映像データ及び第 2 の解像度の映像データを含むテレビジョン放送の搬送波を受信し、当該受信チャンネルデータを再生する処理ステップを含むテレビジョン放送受信方法であって、  
上記処理ステップは、  
第 1 のチャンネル切替手段により、受信チャンネルの切り替えを行って上記第 1 の解像度の映像データを含む任意のチャンネルのデータを出力する第 1 のチャンネル切替ステップと、  
第 2 のチャンネル切替手段により、受信チャンネルの切り替えを行って上記第 2 の解像度の映像データを含む任意のチャンネルのデータを出力する第 2 のチャンネル切替ステップと、  
選択出力手段により、上記第 1 のチャンネル切替手段及び上記第 2 のチャンネル切替手段の各出力の何れかを選択して出力する選択出力ステップと、  
上記選択出力ステップにより選択出力されるデータに含まれる映像データを当該映像データの解像度に基づき再生する再生ステップと、  
少なくとも上記第 1 のチャンネル切替手段、上記第 2 のチャンネル切替手段、及び上記選択出力手段の動作制御を行う制御ステップとを含み、  
上記制御ステップは、上記第 1 のチャンネル切替手段での受信チャンネルが第 1 のチャンネルであり、上記選択

出力手段にて上記第1のチャンネル切替手段の出力が選択されている状態で、上記第1のチャンネル切替手段での上記第1のチャンネルの受信状態から第2のチャンネルの受信状態へのチャンネル切替が発生した場合、当該チャンネル切替が完了するまでの期間、上記第2のチャンネル切替手段で上記第2のチャンネルを受信すると共に、上記選択出力手段で上記第2のチャンネル切替手段の出力を選択するステップを含むことを特徴とするテレビジョン放送受信方法。

【請求項8】 上記制御ステップは、  
上記第2のチャンネル切替手段で上記第2のチャンネルへのチャンネル切替を行うステップと、  
上記第2のチャンネル切替手段での上記第2のチャンネル切替完了後、上記選択出力手段で上記第2のチャンネル切替手段の出力を選択するステップと、  
上記第1のチャンネル切替手段で上記第2のチャンネルへのチャンネル切替を行うステップと、  
上記第1のチャンネル切替手段での上記第2のチャンネル切替完了後、上記選択出力手段で上記第1のチャンネル切替手段の出力を選択するステップとを含むことを特徴とする請求項7記載のテレビジョン放送受信方法。

【請求項9】 上記第1の解像度は、標準解像度を含み、  
上記第2の解像度は、低解像度を含むことを特徴とする請求項7記載のテレビジョン放送受信方法。

【請求項10】 同一チャンネルを、標準解像度と低解像度の異なる各映像データで、且つそれぞれ異なる変調方式で同時に送出するデジタルテレビジョン放送の受信し、当該受信チャンネルデータを再生する処理ステップを含むテレビジョン放送受信方法であって、  
上記処理ステップは、

第1のチューナにより、任意のチャンネルの搬送波を選択及び復調して、上記標準解像度の映像データを含む当該チャンネルのデータを出力する第1のチャンネル切替ステップと、

第2のチューナにより、任意のチャンネルの搬送波を選択及び復調して、上記低解像度の映像データを含む当該チャンネルのデータを出力する第2のチャンネル切替ステップと、

スイッチにより、上記第1のチューナの出力データと、上記第2のチューナの出力データとを択一的に選択して出力する選択出力ステップと、

上記スイッチにより選択出力されたデータに含まれる映像データを当該映像データの解像度に応じてデコードするデコードステップとを含み、

さらに上記処理ステップは、上記第1のチューナにおける第1のチャンネルの受信状態から第2のチャンネルの受信状態へのチャンネル切替が発生した際の処理ステップとして、

上記第2のチューナで第2のチャンネルの選択及び復調

を行う第1のステップと、

上記スイッチで上記第2のチューナの出力の選択を行う第2のステップと、

上記デコーダ部での復号解像度を上記第2のチューナから出力されるデータの映像データの解像度へ設定する第3のステップと、

上記第1のチューナで第2のチャンネルの選択及び復調を行う第4のステップと、

上記スイッチで上記第1のチューナの出力の選択を行う第5のステップと、

上記デコーダ部での復号解像度を上記第1のチューナから出力されるデータの映像データの解像度へ戻す第6のステップとを含むことを特徴とするテレビジョン放送受信方法。

【請求項11】 上記受信チャンネルデータは、MPEG符号化方式に従ったデータを含むことを特徴とする請求項7又は10記載のテレビジョン放送受信方法。

【請求項12】 請求項1～5の何れかに記載のテレビジョン放送受信装置の機能、又は請求項6記載のテレビジョン放送受信システムの機能を実施するための処理プログラムを、コンピュータが読出可能に格納したことを特徴とする記憶媒体。

【請求項13】 請求項7～11の何れかに記載のテレビジョン放送受信方法の処理ステップを、コンピュータが読出可能に格納したことを特徴とする記憶媒体。

【発明の詳細な説明】

【0001】

【発明の属する技術分野】本発明は、例えば、BS (Broadcasting Satellite) による衛星放送等のデジタルテレビジョン放送を受信する装置やシステムに用いられる、テレビジョン放送受信装置、テレビジョン放送受信システム、テレビジョン放送受信方法、及びそれを実施するための処理ステップをコンピュータが読出可能に格納した記憶媒体に関するものである。

【0002】

【従来の技術】近年での日本国においては、2000年末より、BS (Broadcasting Satellite) による衛星デジタル放送 (以下、単に「BSデジタル放送」と言う) が開始される予定であり、これに用いる符号化方式としては、MPEG2符号化方式を採用することが決定されている。

【0003】また、BSデジタル放送では、降雨等により、テレビジョン放送の搬送波の伝送C/N (Carrier to Noise Ratio: 搬送波対雑音比) が低下した場合を想定し、同一チャンネルの番組を、標準解像度の映像を含む搬送波と、低解像度の映像を含む搬送波とを、それぞれ異なる変調方式で同時に伝送する方式 (階層符号化方式) が検討されている。この階層符号化方式では、言うまでもなく、低解像度の映像

を含む搬送波を、標準解像度の映像を含む搬送波よりも、より伝送C/Nの低下した状態で、確実に伝送できる。

#### 【0004】

【発明が解決しようとする課題】しかしながら、上述したようなBSデジタル放送等に対応した従来の受信装置では、チャンネル切替えの際に、所謂チャンネルホッピングと呼ばれる現象に起因する、出力映像信号のフリーズ（停止）状態が生じてしまうことが問題であった。チャンネルホッピングの主な原因としては、

①チューナ切替え動作において、チューナの復号動作が安定するまで時間がかかる。

②MPEG2符号化データが、時間軸及び空間軸において連続性のないパケットデータとして転送されてくる。等が挙げられる。

【0005】上述のようなチャンネルホッピングに起因する出力映像信号のフリーズ（停止）状態は、短時間ではあるがユーザに対して戸惑いを与え、操作性を損なうものである。

【0006】そこで、本発明は、上記の欠点を除去するために成されたもので、標準解像度と低解像度の各映像をそれぞれ異なる変調方式で同時に伝送する方式である階層符号化方式に対応したデジタルテレビジョン放送用の受信装置或いはシステムの特徴を活かし、通常（比較的良好な受信状態において）では使用されていない低解像度映像受信用のチューナを利用して、チャンネルホッピングの主な原因のうちの、チューナの切替え動作およびセトリングに関わる時間（①）を排除することで、出力映像信号のフリーズ（停止）状態を軽減し、チャンネル切替え時であっても、ユーザにとって違和感の少ない映像を提供できる、テレビジョン放送受信装置、テレビジョン放送受信システム、テレビジョン放送受信方法、及びそれを実施するための処理ステップをコンピュータが読出可能に格納した記憶媒体を提供することを目的とする。

#### 【0007】

【課題を解決するための手段】斯かる目的下において、同一チャンネルデータ中に少なくとも第1の解像度の映像データ及び第2の解像度の映像データを含むテレビジョン放送の搬送波を受信するテレビジョン放送受信装置であって、受信チャンネルの切り替えを行って上記第1の解像度の映像データを含む任意のチャンネルのデータを出力する第1のチャンネル切替手段と、受信チャンネルの切り替えを行って上記第2の解像度の映像データを含む任意のチャンネルのデータを出力する第2のチャンネル切替手段と、上記第1のチャンネル切替手段及び上記第2のチャンネル切替手段の各出力の何れかを選択して出力する選択出力手段と、上記選択出力手段から出力されたデータに含まれる映像データを当該映像データの解像度に基づき再生する再生手段と、上記第1のチャ

ネル切替手段での受信チャンネルが第1のチャンネルであり、上記選択出力手段にて上記第1のチャンネル切替手段の出力が選択されている状態で、上記第1のチャンネル切替手段での上記第1のチャンネルの受信状態から第2のチャンネルの受信状態へのチャンネル切替が発生した場合、当該チャンネル切替が完了するまでの期間、上記第2のチャンネル切替手段へ上記第2のチャンネルの受信を行わせると共に、上記選択出力手段へ上記第2のチャンネル切替手段の出力を選択させる制御手段とを備えることを特徴とする。

【0008】第2の発明は、上記第1の発明において、上記制御手段は、上記第2のチャンネル切替手段での上記第2のチャンネル切替完了後、上記第1のチャンネル切替手段へ上記第2のチャンネルへのチャンネル切替を行わせ、当該チャンネル切替完了後、上記選択出力手段へ上記第1のチャンネル切替手段の出力を選択させることを特徴とする。

【0009】第3の発明は、上記第1の発明において、上記第1の解像度は、標準解像度を含み、上記第2の解像度は、低解像度を含むことを特徴とする。

【0010】第4の発明は、同一チャンネルを、標準解像度と低解像度の異なる各映像データで、且つそれぞれ異なる変調方式で同時に送出するデジタルテレビジョン放送の受信に対応したテレビジョン放送受信装置であって、任意のチャンネルの搬送波を選択及び復調して、上記標準解像度の映像データを含むチャンネルデータを出力する第1のチューナと、任意のチャンネルの搬送波を選択及び復調して、上記低解像度の映像データを含むチャンネルデータを出力する第2のチューナと、上記第1のチューナの出力データと、上記第2のチューナの出力データとを択一的に選択するスイッチと、上記スイッチにより選択されたデータに含まれる映像データを当該映像データの解像度に応じてデコードするデコーダ部と、上記第1のチューナにおける第1のチャンネルの受信状態から第2のチャンネルの受信状態へのチャンネル切替が発生した際に、上記第2のチューナで第2のチャンネルの選択及び復調を行い、上記スイッチで上記第2のチューナの出力の選択を行い、上記デコーダ部での復号解像度を上記第2のチューナから出力されるデータの映像データの解像度へ設定し、上記第1のチューナで第2のチャンネルの選択及び復調を行い、上記スイッチで上記第1のチューナの出力の選択を行い、上記デコーダ部での復号解像度を上記第1のチューナから出力されるデータの映像データの解像度へ戻す制御手段を備えることを特徴とする。

【0011】第5の発明は、上記第1又は4の発明において、上記チャンネルデータは、MPEG符号化方式に従ったデータを含むことを特徴とする。

【0012】第6の発明は、複数の機器が互いに通信可能に接続されてなるテレビジョン放送受信システムであ

って、上記複数の機器のうち少なくとも1つの機器は、請求項1～5の何れかに記載のテレビジョン放送受信装置の機能を有することを特徴とする。

【0013】第7の発明は、同一チャンネルデータ中に少なくとも第1の解像度の映像データ及び第2の解像度の映像データを含むテレビジョン放送の搬送波を受信し、当該受信チャンネルデータを再生する処理ステップを含むテレビジョン放送受信方法であって、上記処理ステップは、第1のチャンネル切替手段により、受信チャンネルの切り替えを行って上記第1の解像度の映像データを含む任意のチャンネルのデータを出力する第1のチャンネル切替ステップと、第2のチャンネル切替手段により、受信チャンネルの切り替えを行って上記第2の解像度の映像データを含む任意のチャンネルのデータを出力する第2のチャンネル切替ステップと、選択出力手段により、上記第1のチャンネル切替手段及び上記第2のチャンネル切替手段の各出力の何れかを選択して出力する選択出力ステップと、上記選択出力ステップにより選択出力されるデータに含まれる映像データを当該映像データの解像度に基づき再生する再生ステップと、少なくとも上記第1のチャンネル切替手段、上記第2のチャンネル切替手段、及び上記選択出力手段の動作制御を行う制御ステップとを含み、上記制御ステップは、上記第1のチャンネル切替手段での受信チャンネルが第1のチャンネルであり、上記選択出力手段にて上記第1のチャンネル切替手段の出力が選択されている状態で、上記第1のチャンネル切替手段での上記第1のチャンネルの受信状態から第2のチャンネルの受信状態へのチャンネル切替が発生した場合、当該チャンネル切替が完了するまでの期間、上記第2のチャンネル切替手段で上記第2のチャンネルを受信すると共に、上記選択出力手段で上記第2のチャンネル切替手段の出力を選択するステップを含むことを特徴とする。

【0014】第8の発明は、上記第7の発明において、上記制御ステップは、上記第2のチャンネル切替手段で上記第2のチャンネルへのチャンネル切替を行うステップと、上記第2のチャンネル切替手段での上記第2のチャンネル切替完了後、上記選択出力手段で上記第2のチャンネル切替手段の出力を選択するステップと、上記第1のチャンネル切替手段で上記第2のチャンネルへのチャンネル切替を行うステップと、上記第1のチャンネル切替手段での上記第2のチャンネル切替完了後、上記選択出力手段で上記第1のチャンネル切替手段の出力を選択するステップとを含むことを特徴とする。

【0015】第9の発明は、上記第7の発明において、上記第1の解像度は、標準解像度を含み、上記第2の解像度は、低解像度を含むことを特徴とする。

【0016】第10の発明は、同一チャンネルを、標準解像度と低解像度の異なる各映像データで、且つそれぞれ異なる変調方式で同時に送出するデジタルテレビジ

ョン放送の受信し、当該受信チャンネルデータを再生する処理ステップを含むテレビジョン放送受信方法であって、上記処理ステップは、第1のチューナにより、任意のチャンネルの搬送波を選択及び復調して、上記標準解像度の映像データを含む当該チャンネルのデータを出力する第1のチャンネル切替ステップと、第2のチューナにより、任意のチャンネルの搬送波を選択及び復調して、上記低解像度の映像データを含む当該チャンネルのデータを出力する第2のチャンネル切替ステップと、スイッチにより、上記第1のチューナの出力データと、上記第2のチューナの出力データとを択一的に選択して出力する選択出力ステップと、上記スイッチにより選択出力されたデータに含まれる映像データを当該映像データの解像度に応じてデコードするデコードステップとを含み、さらに上記処理ステップは、上記第1のチューナにおける第1のチャンネルの受信状態から第2のチャンネルの受信状態へのチャンネル切替が発生した際の処理ステップとして、上記第2のチューナで第2のチャンネルの選択及び復調を行う第1のステップと、上記スイッチで上記第2のチューナの出力の選択を行う第2のステップと、上記デコーダ部での復号解像度を上記第2のチューナから出力されるデータの映像データの解像度へ設定する第3のステップと、上記第1のチューナで第2のチャンネルの選択及び復調を行う第4のステップと、上記スイッチで上記第1のチューナの出力の選択を行う第5のステップと、上記デコーダ部での復号解像度を上記第1のチューナから出力されるデータの映像データの解像度へ戻す第6のステップとを含むことを特徴とする。

【0017】第11の発明は、上記第7又は10の発明において、上記受信チャンネルデータは、MPEG符号化方式に従ったデータを含むことを特徴とする。

【0018】第12の発明は、請求項1～5の何れかに記載のテレビジョン放送受信装置の機能、又は請求項6記載のテレビジョン放送受信システムの機能を実施するための処理プログラムを、コンピュータが読出可能に格納した記憶媒体であることを特徴とする。

【0019】第13の発明は、請求項7～11の何れかに記載のテレビジョン放送受信方法の処理ステップを、コンピュータが読出可能に格納した記憶媒体であることを特徴とする。

【0020】具体的には例えば、ユーザ操作により番組1（第1のチャンネル）から番組2（第2のチャンネル）へのチャンネル切替が発生した場合、標準解像度の映像信号受信用の第1のチューナによる搬送波の選択（チャンネル切替）及び復号処理に要するデッドタイムを考慮し、かかる期間中、低解像度の映像信号受信用の第2のチューナにより得られる低解像度の映像信号を復号及び出力（表示出力）する。これにより、チャンネル切替時に発生する表示画面のフリーズ（静止画表示）状態を排除することが可能となる。この低解像度映像の表

示期間中、表示画像品質は、標準解像度の映像信号を復号及び表示したものに比べ幾分低下するが、画面のフリーズ（静止画表示）がないため、チャンネル切替操作に伴う従来のような違和感は軽減される。

#### 【0021】

【発明の実施の形態】以下、本発明の実施の形態について図面を用いて説明する。

【0022】本発明は、例えば、図1に示すような、ディジタルテレビジョン放送用の受信装置100に適用される。この受信装置100は、標準解像度の映像を含む搬送波と、低解像度の映像を含む搬送波とを、それぞれ異なる変調方式で同時に伝送する方式（階層符号化方式）を採用したBSディジタル放送等に対応した受信装置であり、上記図1に示すように、テレビジョン放送電波を受信するためのアンテナ110と、アンテナ110での受信電波の切替え（チャンネル切替え）を行って受信電波のストリームデータを出力するチューナ120a及び120bと、チューナ120a及び120bの各出力データを択一的に選択切替して出力するスイッチ130と、スイッチ130の出力データから音声信号及び映像信号を取得して出力するデコーダ150と、本装置100全体の動作制御を司る制御部140とを備えている。

【0023】＜受信装置100の動作概要＞制御部140は、その内部のマイクロコントローラ（CPU：図示せず）により、本装置100全体の動作制御を行う。例えば、制御部140は、内部メモリに予め記憶された処理プログラムを、CPUにより読み出して実行することで、本装置100全体の動作制御を行う。これにより、受信装置100は、次のように動作する。

【0024】チューナ120aは、アンテナ110を介して供給される複数の受信電波（搬送波）から、標準解像度の映像を含む任意の一波を選択し、その選択搬送波を、複数のプログラムストリームを含む、MPEG2符号化方式でのTS（Transport Stream）データに復号する。一方、チューナ120bは、アンテナ110を介して供給される複数の受信電波（搬送波）から、低解像度の映像を含む任意の一波を選択し、その選択搬送波を、複数のプログラムストリームを含む、MPEG2符号化方式でのTS（Transport Stream）データに復号する。

【0025】スイッチ130は、制御部140からの制御に従って、チューナ120a（標準解像度用チューナ）から供給されたMPEG2符号化方式でのTSデータと、及びチューナ120b（低解像度用チューナ）から供給されたMPEG2符号化方式でのTSデータとを択一的に選択切替して出力する。

【0026】デコーダ150は、MPEG2符号化方式に対応したデコーダ部であり、スイッチ130から出力されるTSデータに含まれる複数のプログラムストリー

ムの中から、任意のプログラムストリームを復号する。

【0027】具体的には、デコーダ150は、デマルチプレクサ151、復号ベースクロック再生部152、バッファ（FIFO）153、ビデオデコーダ154、及びオーディオデコーダ155を備えている。

【0028】デマルチプレクサ（分離部）151は、制御部140からの制御に従って、スイッチ130からのTSデータに含まれる複数のプログラムストリームの中から、特定のPID（Packet Identification：ストリーム識別情報）を含むプログラムストリームを取得し、当該プログラムストリームを構成する複数のPES（Packetized Elementary Stream）パケット及びパケットヘッダをフィルタリングして、ビデオパケット、オーディオパケット、SI（Service Information）、及びPCR（Program Clock Preference：プログラム時刻基準参照値）やSCR（System Clock Reference：システム時刻基準参照値）等の情報を取得する。そして、デマルチプレクサ151は、ビデオパケットをバッファ153を介してビデオデコーダ154へ、オーディオパケットをオーディオデコーダ155へ、PCRやSCR等の情報を復号ベースクロック再生部152へ、SI情報を制御部140へそれぞれ供給する。

【0029】ビデオデコーダ154は、バッファ153へ一時的に蓄積されたビデオパケット（ビデオストリーム）を、ベースバンドのビデオ信号（映像信号）へと復号して出力する。オーディオデコーダ155は、デマルチプレクサ151からのオーディオパケット（オーディオストリーム）を、ベースバンドのオーディオ信号（音声信号）へと復号して出力する。

【0030】復号ベースクロック再生部152は、デマルチプレクサ151からのPCRやSCR等の情報から、ビデオストリーム及びオーディオストリームの復号に必要な、27MHzのリファレンスクロックを生成し、そのリファレンスクロックを、ビデオデコーダ154及びオーディオデコーダ155へとそれぞれ供給する。したがって、ビデオデコーダ154及びオーディオデコーダ155はそれぞれ、復号ベースクロック再生部152からのリファレンスクロックに従って、ビデオストリーム及びオーディオストリームを復号する。

【0031】制御部140は、ユーザから操作されるリモートコントロール装置（リモコン）からの信号受信のためのインターフェース、チャンネル表示のためLED等を備え、デマルチプレクサ151からのSI情報に基づき、上記リモコン操作等によるチャンネル選択及び切替動作のための制御等を行う。

【0032】＜受信装置100の最も特徴とする動作＞図2は、受信装置100での番組1から番組2へのチャンネル切替え時における、標準解像度用チューナ120

a及び低解像度用チューナ120bでのチャンネル切替動作、スイッチ130での出力データの切替動作、及びビデオデコーダ154での復号解像度の切替動作を模式的に示したものである。上記図2に示される動作は、制御部140の動作制御により、次のようにして実施される。

【0033】ステップS201、S202：先ず、上述したユーザからのリモコン操作等により、チャンネル切替（番組から番組2への切替え）がタイミング①で発生すると（ステップS201）、このタイミング①で、制御部140は、低解像度用チューナ120bに対して、番組2の搬送波（低解像度の番組2の映像を含む搬送波）を選択するよう指示する（ステップS202）。これにより、低解像度用チューナ120bは、受信チャンネルを番組2に切り替える。

【0034】ステップS203：次に、制御部140は、低解像度用チューナ120bでの番組2へのチャンネル切替動作が完了し、そのTSデータを出力できる状態（タイミング②の状態）を確認すると、スイッチ130に対して、出力データとして低解像度用チューナ120bの出力を選択するよう指示する。これにより、スイッチ130は、今まで出力データとして選択していた標準解像度用チューナ120aの出力を、低解像度用チューナ120bの出力へと切り替える。

【0035】ステップS204：また、制御部140は、ビデオデコーダ154での復号解像度を、低解像度用チューナ120bから出力されるTSデータのビデオストリームの解像度（低解像度）に一致させる。これにより、ビデオデコーダ154は、低解像度での復号処理（番組2のビデオストリームに対する低解像度での復号処理）を実行する。

【0036】ステップS205：以上の動作により、標準解像度の番組1のチャンネルのビデオストリームが復号出力されている状態において、タイミング①で番組2へのチャンネル切替が発生すると、当該タイミング①からタイミング②の期間に、低解像度用チューナ120bでの番組2（低解像度の番組2の映像）へのチャンネル切替、スイッチ130での低解像度用チューナ120bの出力への切替、及びビデオデコーダ154での低解像度の復号処理への切替がなされ（ステップS201～S204）、タイミング②からは、低解像度の番組2のチャンネルのビデオストリームが復号出力される（ステップS205）。タイミング①からタイミング②の間中は、標準解像度の番組1のチャンネルのビデオストリームが復号出力されている状態である。

【0037】ステップS206：次に、制御部140は、タイミング②で、標準解像度用チューナ120aに対して、番組2の搬送波（標準解像度の番組2の映像を含む搬送波）を選択するよう指示する。これにより、標準解像度用チューナ120aは、受信チャンネルを番組

2に切り替える。

【0038】ステップS207：次に、制御部140は、標準解像度用チューナ120aでの番組2へのチャンネル切替動作が完了し、そのTSデータを出力できる状態（タイミング③の状態）を確認すると、スイッチ130に対して、出力データとして標準解像度用チューナ120aの出力を選択するよう指示する。これにより、スイッチ130は、今まで出力データとして選択していた低解像度用チューナ120bの出力を、標準解像度用チューナ120aの出力へと切り替える。

【0039】ステップS208：また、制御部140は、ビデオデコーダ154での復号解像度を、標準解像度用チューナ120aから出力されるTSデータのビデオストリームの解像度（標準解像度）に一致させる。これにより、ビデオデコーダ154は、標準解像度での復号処理（番組2のビデオストリームに対する標準解像度での復号処理）を実行する。

【0040】ステップS209：以上の動作により、タイミング②からの、低解像度の番組2のチャンネルのビデオストリームが復号出力されている状態にて、標準解像度用チューナ120aでのチャンネル切替動作が行われる（ステップS206～S208）。この間はもちろん、低解像度の番組2のチャンネルのビデオストリームが復号出力されている状態である。そして、標準解像度用チューナ120aでのチャンネル切替動作が完了すると（タイミング③）、スイッチ130での標準解像度用チューナ120aの出力への切替、及びビデオデコーダ154での標準解像度の復号処理への切替がなされ、標準解像度の番組2のチャンネルのビデオストリームが復号出力される（ステップS209）。

【0041】したがって、従来では、図3の“(D)復号映像信号”に示すように、チャンネル切替えの際には、出力映像信号のフリーズ状態（同図中“①”参照）が生じていたのに対して、本実施の形態では、チャンネル切り替えが発生すると、そのチャンネル切替動作が完了するまでの期間、低解像度の映像の放送受信及びその復号出力を行うように構成したので、上記図2の“(D)復号映像信号”に示すように、出力映像信号のフリーズ状態は発生しない。

【0042】尚、上記図1に示した受信装置100の構成において、例えば、バッファ153を、スイッチ130とデマルチプレクサ151の間に設けるようにしてもよい。

【0043】また、本発明の目的は、本実施の形態のホスト及び端末の機能を実現するソフトウェアのプログラムコードを記憶した記憶媒体を、システム或いは装置に供給し、そのシステム或いは装置のコンピュータ（又はCPUやMPU）が記憶媒体に格納されたプログラムコードを読みだして実行することによっても、達成されることは言うまでもない。この場合、記憶媒体から読み出

されたプログラムコード自体が本実施の形態の機能を実現することとなり、そのプログラムコードを記憶した記憶媒体は本発明を構成することとなる。プログラムコードを供給するための記憶媒体としては、ROM、フロッピー（登録商標）ディスク、ハードディスク、光ディスク、光磁気ディスク、CD-ROM、CD-R、磁気テープ、不揮発性のメモリカード等を用いることができる。また、コンピュータが読みだしたプログラムコードを実行することにより、本実施の形態の機能が実現されるだけでなく、そのプログラムコードの指示に基づき、コンピュータ上で稼動しているOS等が実際の処理の一部又は全部を行い、その処理によって本実施の形態の機能が実現される場合も含まれることは言うまでもない。さらに、記憶媒体から読み出されたプログラムコードが、コンピュータに挿入された拡張機能ボードやコンピュータに接続された機能拡張ユニットに備わるメモリに書き込まれた後、そのプログラムコードの指示に基づき、その機能拡張ボードや機能拡張ユニットに備わるCPUなどが実際の処理の一部又は全部を行い、その処理によって本実施の形態の機能が実現される場合も含まれることは言うまでもない。

#### 【0044】

【発明の効果】以上説明したように本発明によれば、チャンネル切替が発生すると、そのチャンネル切替が完了する期間、一時的に低解像度の映像データを含むチャンネルデータの受信状態へ切り替えるように構成したので、標準解像度と低解像度の各映像をそれぞれ異なる変

調方式で同時に伝送する方式である階層符号化方式を採用したBSデジタル放送等のテレビジョン放送に対応した受信装置或いはシステムにおいて、チャンネル切替に伴い発生する表示画像のフリーズ状態（静止画表示）を回避することができ、スムーズな、且つ表示画像に違和感のない快適なチャンネル切替操作を実現できる。

#### 【図面の簡単な説明】

【図1】本発明を適用したデジタルテレビジョン放送の受信装置の構成を示すブロック図である。

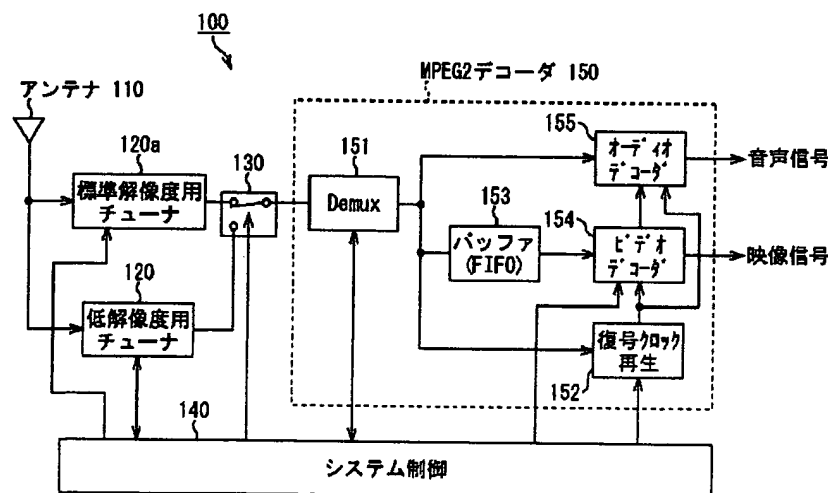
【図2】上記受信装置の動作を説明するためのフローチャートである。

【図3】上記従来のチャンネル切り替え動作を説明するための図である。

#### 【符号の説明】

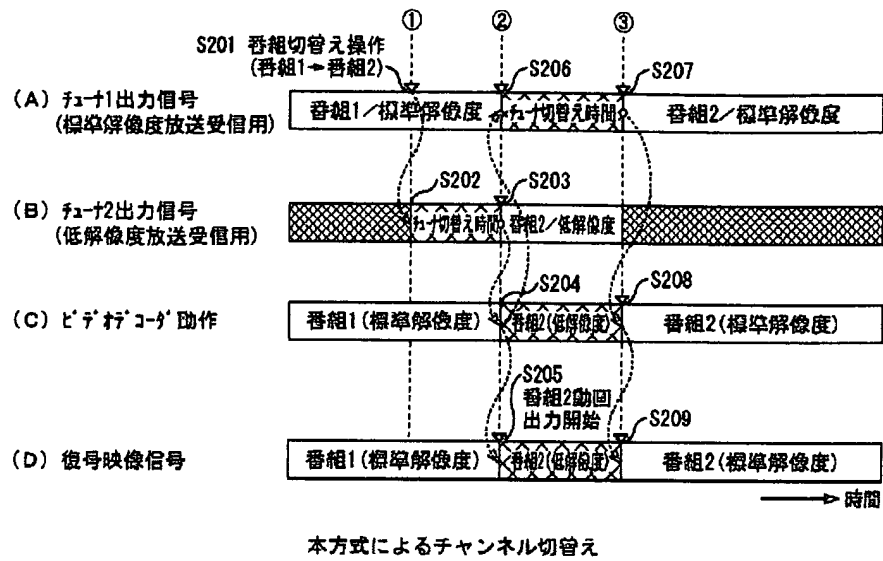
- 100 受信装置
- 110 アンテナ
- 120a 標準解像度用チューナ
- 120b 低解像度用チューナ
- 130 スイッチ
- 140 システム制御部
- 150 MPEG2デコーダ部
- 151 デマルチプレクサ
- 152 復号ペースクロック再生部
- 153 バッファ(FIFO)
- 154 ビデオデコーダ
- 155 オーディオデコーダ

【図1】

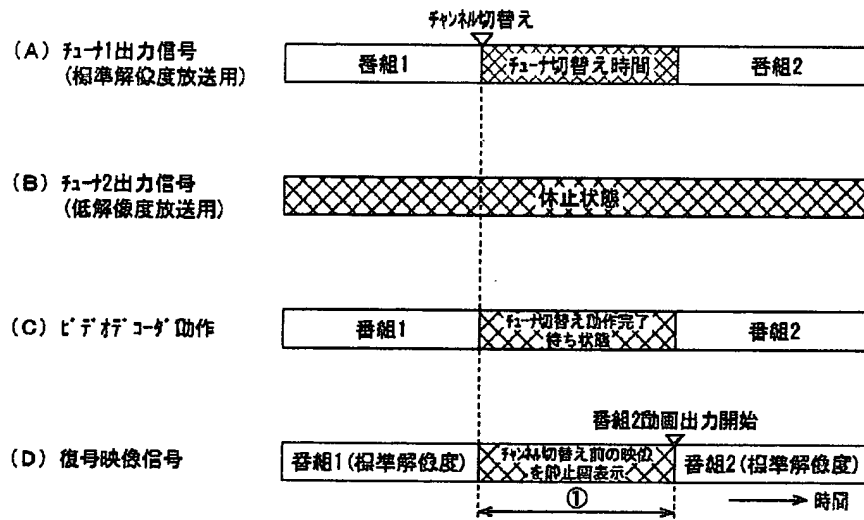




【図2】



【図3】



# PATENT ABSTRACTS OF JAPAN

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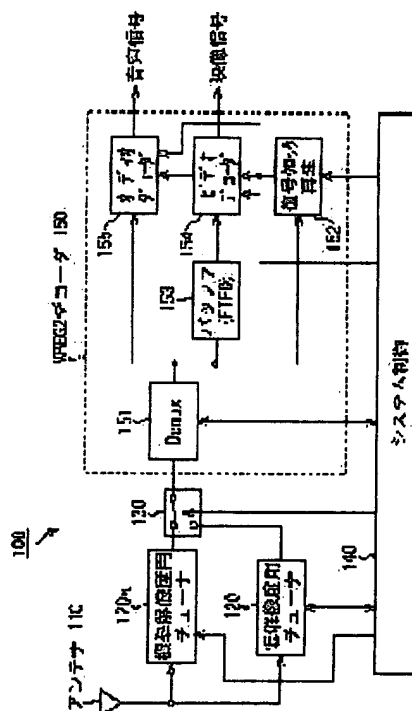
(21)Application number : 2000-096478 (71)Applicant : CANON INC  
(22)Date of filing : 31.03.2000 (72)Inventor : TAKAYAMA TADASHI

## (54) TELEVISION BROADCASTING RECEIVER, TELEVISION BROADCASTING RECEPTION SYSTEM, TELEVISION BROADCASTING RECEPTION METHOD AND STORAGE MEDIUM

### (57)Abstract:

PROBLEM TO BE SOLVED: To provide a television broadcasting receiver capable of reducing the freeze (stop) state of output video signals generated accompanying channel changeover and providing video images with less feeling of incompatibility to a user even at the time of the channel changeover.

SOLUTION: When the channel changeover (changeover from a first channel to a second channel) in a first channel changeover means 120a occurs, a control means 140 makes a second channel changeover means 120b receive the second channel and also makes a selective output means 130 select the output of the second channel changeover means 120b until the channel changeover is completed.



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5C025

5C059

5C064

**F-term (reference)**

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5C059 KK15 MA00 MA31 RD03 SS02 TA39 TC47 UA05

5C064 DA02 DA07

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**Abstract:**

[illegible]

**(57) Abstract**

**Means for Solution**When a channel change (change to the 2nd channel from the 1st channel) by the 1st channel switching means 120a occurs, the control means 140, The 2nd channel is made to receive to the 2nd channel switching means 120b during the period until the channel change concerned is completed, and an output of the 2nd channel switching means 120b is made to choose to the selection output means 130.

A reproduction means which reproduces picture image data contained in data outputted from the above-mentioned selection output means based on resolution of the picture image data

concerned, In the state where a receiving channel in a channel switching means of the above 1st is the 1st channel, and an output of a channel switching means of the above 1st is chosen in the above-mentioned selection output means. When a channel change to a receive state of the 2nd channel of the 1st channel of the above in a channel switching means of the above 1st from a receive state occurs, A control means as which make the 2nd channel of the above receive to a channel switching means of the above 2nd during the period until the channel change concerned is completed, and an output of a channel switching means of the above 2nd is made to choose to the above-mentioned selection output means.

**Claim 2**The above-mentioned control means After the completion of a channel change of the above 2nd by a channel switching means of the above 2nd, The television broadcasting receiving set according to claim 1 making a channel change to the 2nd channel of the above perform to a channel switching means of the above 1st, and making an output of a channel switching means of the above 1st choose to the above-mentioned selection output means after the completion of a channel change concerned.

**Claim 3**The television broadcasting receiving set according to claim 1, wherein the 1st resolution of the above contains standard resolution and the 2nd resolution of the above contains a low resolution.

**Claim 4**The same channel with each picture image data in which standard resolution differs from a low resolution. And with a modulation method different, respectively, are a television broadcasting receiving set corresponding to reception of digital television broadcast sent out simultaneously, and it chooses and restores to a subcarrier of arbitrary channels, The 1st tuner that outputs channel data containing picture image data of the above-mentioned standard resolution, The 2nd tuner that outputs channel data which chooses and restores to a subcarrier of arbitrary channels, and contains picture image data of the above-mentioned low resolution, A switch which chooses alternatively output data of the 1st tuner of the above, and output data of the 2nd tuner of the above, A decoder section which decodes picture image data contained in data selected with the above-mentioned switch according to resolution of the picture image data concerned, When a channel change to a receive state of the 2nd channel of the 1st channel in the 1st tuner of the above from a receive state occurs, The 2nd tuner of the above performs selection and a recovery of the 2nd of a channel, choose an output of the 2nd tuner of the above with the above-mentioned switch, and decoding resolution in the above-mentioned decoder section is set to resolution of picture image data of data outputted from the 2nd tuner of the above, The 1st tuner of the above performs selection and a recovery of the 2nd of a channel, and an output of the 1st tuner of the above is chosen with the above-mentioned switch, A television broadcasting receiving set provided with a control means which returns decoding resolution in the above-mentioned decoder section to resolution of picture image data of data outputted from the 1st tuner of the above.

**Claim 5**The television broadcasting receiving set according to claim 1 or 4, wherein the above-mentioned channel data contains data according to an MPEG coding method.

**Claim 6**The Television Sub-Division broadcast receiving system which two or more apparatus is the Television Sub-Division broadcast receiving systems which it comes to connect mutually so that communication is possible, and is characterized by at least one apparatus having a function of the television broadcasting receiving set according to any one of claims 1 to 5 among two or more above-mentioned apparatus.

**Claim 7**A subcarrier of television broadcasting which contains picture image data of the 1st resolution and picture image data of the 2nd resolution at least in the same channel data is received, Are a processing step which reproduces the receiving channel data concerned the Television Sub-Division broadcast receiving method to include, and the above-mentioned processing step, By the 1st channel change step that outputs data of arbitrary channels which change a receiving channel and contain picture image data of the 1st resolution of the above by the 1st channel switching means, and the 2nd channel switching means. By the 2nd channel change step that outputs data of arbitrary channels which change a receiving channel and contain picture image data of the 2nd resolution of the above, and a selection output means. A selected output step which chooses any of each output of a channel switching means of the above 1st, and a channel switching means of the above 2nd they are, and is outputted, Regeneration steps which reproduce picture image data contained in data in which a selected output is carried out by the above-mentioned selected output step based on resolution of the picture image data concerned, At least motion control of a channel switching means of the above 1st, a channel switching means of the above 2nd, and the above-mentioned selection

output means including a control step to perform the above-mentioned control step, A receiving channel in a channel switching means of the above 1st is the 1st channel.

In the state where an output of a channel switching means of the above 1st is chosen in the above-mentioned selection output means. When a channel change to a receive state of the 2nd channel of the 1st channel of the above in a channel switching means of the above 1st from a receive state occurs, The Television Sub-Division broadcast receiving method by which receiving the 2nd channel of the above by a channel switching means of the above 2nd during the period until the channel change concerned is completed, and a step which chooses an output of a channel switching means of the above 2nd by the above-mentioned selection output means being included.

**Claim 8** A step to which the above-mentioned control step performs a channel change to the 2nd channel of the above by a channel switching means of the above 2nd, A step which chooses an output of a channel switching means of the above 2nd by the above-mentioned selection output means after the completion of a channel change of the above 2nd by a channel switching means of the above 2nd, A step which performs a channel change to the 2nd channel of the above by a channel switching means of the above 1st, The Television Sub-Division broadcast receiving method according to claim 7 containing a step which chooses an output of a channel switching means of the above 1st by the above-mentioned selection output means after the completion of a channel change of the above 2nd by a channel switching means of the above 1st.

**Claim 9** The Television Sub-Division broadcast receiving method according to claim 7, wherein the 1st resolution of the above contains standard resolution and the 2nd resolution of the above contains a low resolution.

**Claim 10** The same channel with each picture image data in which standard resolution differs from a low resolution. And digital television broadcast simultaneously sent out with a modulation method different, respectively receives, Are a processing step which reproduces the receiving channel data concerned the Television Sub-Division broadcast receiving method to include, and the above-mentioned processing step, With the 1st channel change step that outputs data of the channel concerned which chooses and restores to a subcarrier of arbitrary channels, and contains picture image data of the above-mentioned standard resolution with the 1st tuner, and the 2nd tuner. With the 2nd channel change step that outputs data of the channel concerned which chooses and restores to a subcarrier of arbitrary channels, and contains picture image data of the above-mentioned low resolution, and a switch. A selected output step which chooses alternatively output data of the 1st tuner of the above, and output data of the 2nd tuner of the above, and outputs them, Including a decoding step which decodes picture image data contained in data by which the selected output was carried out with the above-mentioned switch according to resolution of the picture image data concerned, further the above-mentioned processing step, As a processing step at the time of a channel change to a receive state of the 2nd channel of the 1st channel in the 1st tuner of the above from a receive state occurring, The 1st step that performs selection and a recovery of the 2nd of a channel with the 2nd tuner of the above, The 2nd step that chooses an output of the 2nd tuner of the above with the above-mentioned switch, The 3rd step that sets decoding resolution in the above-mentioned decoder section to resolution of picture image data of data outputted from the 2nd tuner of the above, The 4th step that performs selection and a recovery of the 2nd of a channel with the 1st tuner of the above, The Television Sub-Division broadcast receiving method containing the 5th step that chooses an output of the 1st tuner of the above with the above-mentioned switch, and the 6th step that returns decoding resolution in the above-mentioned decoder section to resolution of picture image data of data outputted from the 1st tuner of the above.

**Claim 11** The Television Sub-Division broadcast receiving method according to claim 7 or 10, wherein the above-mentioned receiving channel data contains data according to an MPEG coding method.

**Claim 12** A storage storing a processing program for carrying out a function of the television broadcasting receiving set according to any one of claims 1 to 5, or a function of the Television Sub-Division broadcast receiving system according to claim 6 so that read-out of a computer is possible.

**Claim 13** A storage storing a processing step of the Television Sub-Division broadcast receiving method according to any one of claims 7 to 11 so that read-out of a computer is possible.

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**Detailed Description of the Invention****0001**

**Field of the Invention.** This invention is used for the device and system which receive digital television broadcast of the satellite broadcasting by BS (Broadcasting Satellite), etc., for example. It is related with the storage which stored the processing step for carrying a television broadcasting receiving set, the Television Sub-Division broadcast receiving system, the Television Sub-Division broadcast receiving method, and it out so that read-out of a computer was possible.

**0002**

**Description of the Prior Art**Satellite digital broadcasting according on Japan in recent years, and from the end of 2000 to BS (Broadcasting Satellite). (It is only hereafter called "BS digital broadcasting") is due to be started, and adopting an MPEG 2 coding mode is determined as a coding mode used for this.

**0003**In BS digital broadcasting, the case where transmission C/N (Carrier to Noise Ratio: carrier-to-noise ratio) of the subcarrier of television broadcasting falls is assumed by a rainfall etc., The method (hierarchy encoding system) which transmits simultaneously the subcarrier which includes the image of standard resolution for the program of the same channel, and a subcarrier including the image of a low resolution with a modulation method different, respectively is examined. In this hierarchy encoding system, it is needless to say and a subcarrier including the image of a low resolution can be certainly transmitted in the state where transmission C/N fell more, rather than a subcarrier including the image of standard resolution.

**0004**

**Problem(s) to be Solved by the Invention**However, it was a problem that the frieze (stop) state of an output video signal which originates in the phenomenon called what is called channel hopping in the case of a channel change in the conventional receiving set corresponding to BS digital broadcasting etc. which were mentioned above arises. As main causes of channel hopping, in \*\* tuner switching operation, it takes time until the decoding operation of a tuner is stabilized.

\*\* MPEG 2 coding data is transmitted as packet data which are discontinuous in a time-axis and a space axis. \*\* is mentioned.

**0005**Although the frieze (stop) state of the output video signal resulting from the above channel hopping is a short time, it gives puzzlement to a user, and it spoils operativity.

**0006**Then, accomplished this invention in order to remove the above-mentioned fault, and the receiving set for digital television broadcast corresponding to the hierarchy encoding system which is a method which transmits each image of standard resolution and a low resolution simultaneously with a modulation method different, respectively, or the feature of a system is harnessed, The tuner for low resolution image reception which is not used in usual (setting to a comparatively good receive state) is used, By eliminating the time (\*\*) in connection with the switching operation and settling of a tuner of the main causes of channel hopping. Even if the frieze (stop) state of an output video signal is reduced and it is at the channel change time, It aims at providing the storage which stored the processing step for carrying out the television broadcasting receiving set, the Television Sub-Division broadcast receiving system, the Television Sub-Division broadcast receiving method, and it which can provide an image with little sense of incongruity for a user so that read-out of a computer was possible.

**0007**

**Means for Solving the Problem**This invention is characterized by that the bottom of this purpose comprises:

It is a television broadcasting receiving set which receives a subcarrier of television broadcasting which contains picture image data of the 1st resolution, and picture image data of the 2nd resolution at least in the same channel data, The 1st channel switching means that outputs data of arbitrary channels which change a receiving channel and contain picture image data of the 1st resolution of the above.

The 2nd channel switching means that outputs data of arbitrary channels which change a receiving channel and contain picture image data of the 2nd resolution of the above.

A selection output means which chooses any of each output of a channel switching means of the above 1st, and a channel switching means of the above 2nd they are, and is outputted.

A reproduction means which reproduces picture image data contained in data outputted from

the above-mentioned selection output means based on resolution of the picture image data concerned, In the state where a receiving channel in a channel switching means of the above 1st is the 1st channel, and an output of a channel switching means of the above 1st is chosen in the above-mentioned selection output means. When a channel change to a receive state of the 2nd channel of the 1st channel of the above in a channel switching means of the above 1st from a receive state occurs, A control means as which make the 2nd channel of the above receive to a channel switching means of the above 2nd during the period until the channel change concerned is completed, and an output of a channel switching means of the above 2nd is made to choose to the above-mentioned selection output means.

**0008**In the 1st above-mentioned invention, the 2nd invention the above-mentioned control means, After the completion of a channel change of the above 2nd by a channel switching means of the above 2nd, A channel change to the 2nd channel of the above is made to perform to a channel switching means of the above 1st, and an output of a channel switching means of the above 1st is made to choose to the above-mentioned selection output means after the completion of a channel change concerned.

**0009**In the 3rd invention, in the 1st above-mentioned invention, the 1st resolution of the above contains standard resolution, and the 2nd resolution of the above contains a low resolution.

**0010**The 4th invention is each picture image data in which standard resolution differs the same channel from a low resolution, And with a modulation method different, respectively, are a television broadcasting receiving set corresponding to reception of digital television broadcast sent out simultaneously, and it chooses and restores to a subcarrier of arbitrary channels, The 1st tuner that outputs channel data containing picture image data of the above-mentioned standard resolution, The 2nd tuner that outputs channel data which chooses and restores to a subcarrier of arbitrary channels, and contains picture image data of the above-mentioned low resolution, A switch which chooses alternatively output data of the 1st tuner of the above, and output data of the 2nd tuner of the above, A decoder section which decodes picture image data contained in data selected with the above-mentioned switch according to resolution of the picture image data concerned, When a channel change to a receive state of the 2nd channel of the 1st channel in the 1st tuner of the above from a receive state occurs, The 2nd tuner of the above performs selection and a recovery of the 2nd of a channel, choose an output of the 2nd tuner of the above with the above-mentioned switch, and decoding resolution in the above-mentioned decoder section is set to resolution of picture image data of data outputted from the 2nd tuner of the above, The 1st tuner of the above performs selection and a recovery of the 2nd of a channel, an output of the 1st tuner of the above is chosen with the above-mentioned switch, and it has a control means which returns decoding resolution in the above-mentioned decoder section to resolution of picture image data of data outputted from the 1st tuner of the above.

**0011**In the above 1st or an invention of 4, as for the 5th invention, the above-mentioned channel data contains data according to an MPEG coding method.

**0012**The 6th invention is the Television Sub-Division broadcast receiving system to which it comes to connect two or more apparatus of each other so that communication is possible, and, as for at least one apparatus, it has a function of the television broadcasting receiving set according to any one of claims 1 to 5 among two or more above-mentioned apparatus.

**0013**The 7th invention receives a subcarrier of television broadcasting which contains picture image data of the 1st resolution, and picture image data of the 2nd resolution at least in the same channel data, Are a processing step which reproduces the receiving channel data concerned the Television Sub-Division broadcast receiving method to include, and the above-mentioned processing step, By the 1st channel change step that outputs data of arbitrary channels which change a receiving channel and contain picture image data of the 1st resolution of the above by the 1st channel switching means, and the 2nd channel switching means. By the 2nd channel change step that outputs data of arbitrary channels which change a receiving channel and contain picture image data of the 2nd resolution of the above, and a selection output means. A selected output step which chooses any of each output of a channel switching means of the above 1st, and a channel switching means of the above 2nd they are, and is outputted, Regeneration steps which reproduce picture image data contained in data in which a selected output is carried out by the above-mentioned selected output step based on resolution of the picture image data concerned, At least motion control of a channel switching means of the above 1st, a channel switching means of the above 2nd, and the above-mentioned selection



output means including a control step to perform the above-mentioned control step, In the state where a receiving channel in a channel switching means of the above 1st is the 1st channel, and an output of a channel switching means of the above 1st is chosen in the above-mentioned selection output means. When a channel change to a receive state of the 2nd channel of the 1st channel of the above in a channel switching means of the above 1st from a receive state occurs, The 2nd channel of the above is received by a channel switching means of the above 2nd during the period until the channel change concerned is completed, and a step which chooses an output of a channel switching means of the above 2nd by the above-mentioned selection output means is included.

**0014**The 8th invention is **this invention** characterized by that the 7th above-mentioned invention comprises the following.

A step to which the above-mentioned control step performs a channel change to the 2nd channel of the above by a channel switching means of the above 2nd.

A step which chooses an output of a channel switching means of the above 2nd by the above-mentioned selection output means after the completion of a channel change of the above 2nd by a channel switching means of the above 2nd.

A step which performs a channel change to the 2nd channel of the above by a channel switching means of the above 1st.

A step which chooses an output of a channel switching means of the above 1st by the above-mentioned selection output means after the completion of a channel change of the above 2nd by a channel switching means of the above 1st.

**0015**In the 9th invention, in the 7th above-mentioned invention, the 1st resolution of the above contains standard resolution, and the 2nd resolution of the above contains a low resolution.

**0016**The 10th invention is each picture image data in which standard resolution differs the same channel from a low resolution, And digital television broadcast simultaneously sent out with a modulation method different, respectively receives, Are a processing step which reproduces the receiving channel data concerned the Television Sub-Division broadcast receiving method to include, and the above-mentioned processing step, With the 1st channel change step that outputs data of the channel concerned which chooses and restores to a subcarrier of arbitrary channels, and contains picture image data of the above-mentioned standard resolution with the 1st tuner, and the 2nd tuner. With the 2nd channel change step that outputs data of the channel concerned which chooses and restores to a subcarrier of arbitrary channels, and contains picture image data of the above-mentioned low resolution, and a switch. A selected output step which chooses alternatively output data of the 1st tuner of the above, and output data of the 2nd tuner of the above, and outputs them, Including a decoding step which decodes picture image data contained in data by which the selected output was carried out with the above-mentioned switch according to resolution of the picture image data concerned, further the above-mentioned processing step, As a processing step at the time of a channel change to a receive state of the 2nd channel of the 1st channel in the 1st tuner of the above from a receive state occurring. The 1st step that performs selection and a recovery of the 2nd of a channel with the 2nd tuner of the above, The 2nd step that chooses an output of the 2nd tuner of the above with the above-mentioned switch, The 3rd step that sets decoding resolution in the above-mentioned decoder section to resolution of picture image data of data outputted from the 2nd tuner of the above, The 4th step that performs selection and a recovery of the 2nd of a channel with the 1st tuner of the above, The 5th step that chooses an output of the 1st tuner of the above with the above-mentioned switch, and the 6th step that returns decoding resolution in the above-mentioned decoder section to resolution of picture image data of data outputted from the 1st tuner of the above are included.

**0017**In the above 7th or an invention of 10, as for the 11th invention, the above-mentioned receiving channel data contains data according to an MPEG coding method.

**0018**The 12th invention is characterized by being the storage which stored a processing program for carrying out a function of the television broadcasting receiving set according to any one of claims 1 to 5, or a function of the Television Sub-Division broadcast receiving system according to claim 6 so that read-out of a computer was possible.

**0019**The 13th invention is characterized by being the storage which stored a processing step of the Television Sub-Division broadcast receiving method according to any one of claims 7 to 11 so that read-out of a computer was possible.

**0020**When a channel change in the program 2 (the 2nd channel) from the program 1 (the 1st

channel) specifically occurs by user's operation, In consideration of a dead time which selection (channel change) and decoding processing of a subcarrier by the 1st tuner for video-signal reception of standard resolution take, a video signal of a low resolution obtained by the 2nd tuner for video-signal reception of a low resolution is decoded and outputted during this period (display output). It enables this to eliminate a frieze (Still Picture Sub-Division display) state of a display screen generated at the time of a channel change. During a display period of this low resolution image, although display image quality deteriorates a little compared with what decoded and displayed a video signal of standard resolution, since there is no frieze (Still Picture Sub-Division display) of a screen, sense of incongruity like before accompanying channel switching control is reduced.

**0021**

**Embodiment of the Invention** Hereafter, an embodiment of the invention is described using Drawings.

**0022** This invention is applied to the receiving set 100 for digital television broadcast as shown in drawing 1, for example. This receiving set 100 is provided with the following.

A subcarrier including the image of standard resolution.

The antenna 110 for receiving the Television Sub-Division broadcasting electric-wave, as it is a receiving set corresponding to BS digital broadcasting etc. which adopted the method (hierarchy encoding system) which transmits simultaneously a subcarrier including the image of a low resolution with a modulation method different, respectively and is shown in above-mentioned drawing 1.

The tuners 120a and 120b which change the reception radio wave in the antenna 110 (channel change), and output the stream data of a reception radio wave.

The switch 130 which carries out a selection change alternatively and outputs each output data of the tuners 120a and 120b, the decoder 150 which acquires an audio signal and a video signal from the output data of the switch 130, and is outputted, and the control section 140 which manages the motion control of the this device 100 whole.

**0023** The <operation outline of receiving set 100> control section 140 performs motion control of the this device 100 whole with the microcontroller (CPU: not shown) of the inside. For example, the control section 140 is reading the processing program beforehand memorized by the internal memory by CPU, and executing it, and performs motion control of the this device 100 whole. Thereby, the receiving set 100 operates as follows.

**0024** The tuner 120a from two or more reception radio waves (subcarrier) supplied via the antenna 110. One arbitrary waves including the image of standard resolution are chosen, and the selection subcarrier is decoded to TS (Transport Stream) data in the MPEG 2 coding mode containing two or more program streams. On the other hand, the tuner 120b from two or more reception radio waves (subcarrier) supplied via the antenna 110. One arbitrary waves including the image of a low resolution are chosen, and the selection subcarrier is decoded to TS (Transport Stream) data in the MPEG 2 coding mode containing two or more program streams.

**0025** The TS data in the MPEG 2 coding mode with which the switch 130 was supplied from the tuner 120a (tuner for standard resolution) according to the control from the control section 140, And a selection change is carried out alternatively and the TS data in the MPEG 2 coding mode supplied from the tuner 120b (tuner for low resolutions) are outputted.

**0026** The decoder 150 is a decoder section corresponding to an MPEG 2 coding mode, and decodes arbitrary program streams out of two or more program streams contained in the TS data outputted from the switch 130.

**0027** Specifically, the decoder 150 is provided with the demultiplexer 151, the decoding base clock regenerating section 152, the buffer (FIFO) 153, the video decoder 154, and the audio decoder 155.

**0028** According to the control from the control section 140, the demultiplexer (separation part) 151, Out of two or more program streams contained in the TS data from the switch 130. The program stream containing specific PID (Packet Identification: stream identification information) is acquired, Two or more PES (Packetized Elementary Stream) packets and packet headers which constitute the program stream concerned are filtered, A video packet, an audio packet, SI (Service Information), And information, including PCR (Program Clock Peference: program time reference value), SCR (System Clock Peference: system time standard reference value), etc., is acquired. And the demultiplexer 151 passes through a video packet video decoder 154 via the buffer 153, and information, including PCR, SCR, etc., is supplied to the decoding base clock regenerating section 152, and it supplies SI information for an audio packet to the control

section 140 to the audio decoder 155, respectively.

**0029**The video decoder 154 decodes the video packet (video stream) accumulated temporarily to the video signal (video signal) of baseband, and outputs it to the buffer 153. The audio decoder 155 decodes the audio packet (audio stream) from the demultiplexer 151 to the audio signal (audio signal) of baseband, and outputs it.

**0030**The decoding base clock regenerating section 152 from information, including PCR from the demultiplexer 151, SCR, etc. A 27-MHz reference clock required for decoding of a video stream and an audio stream is generated, and the reference clock is supplied to the video decoder 154 and the audio decoder 155, respectively. Therefore, the video decoder 154 and the audio decoder 155 decode a video stream and an audio stream according to the reference clock from the decoding base clock regenerating section 152, respectively.

**0031**The interface for the signal reception from the remote control device (remote control) with which the control section 140 is operated from a user, It has LED etc. for a channel display and control for the channel selection by the above-mentioned remote control operation etc. and switching operation, etc. are performed based on the SI information from the demultiplexer 151.

**0032**<Operation of receiving set 100 by which it is characterized most> drawing 2, . It can set at the time of the channel change in the program 2 in the receiving set 100 from the program 1. The channel switching operation in the tuner 120a for standard resolution and the tuner 120b for low resolutions, the switching operation of the output data in the switch 130, and the switching operation of the decoding resolution in the video decoder 154 are shown typically. Operation shown in above-mentioned drawing 2 is carried out as follows by the motion control of the control section 140.

**0033**Step S201, S202 : When a channel change (change in the program 2 from a program) occurs in timing \*\* (Step S201), first by the remote control operation from a user etc. which were mentioned above by this timing \*\*. The control section 140 directs to choose the subcarrier (subcarrier including the image of the program 2 of a low resolution) of the program 2 to the tuner 120b for low resolutions (Step S202). Thereby, the tuner 120b for low resolutions changes a receiving channel to the program 2.

**0034**If the state (state of timing \*\*) where the channel switching operation to the program 2 in the tuner 120b for low resolutions completes step S203:, next the control section 140, and the TS data can be outputted is checked, It directs to choose the output of the tuner 120b for low resolutions as output data to the switch 130. Thereby, the switch 130 changes the output of the tuner 120a for standard resolution selected as output data until now to the output of the tuner 120b for low resolutions.

**0035**Step S204: The control section 140 coincides the decoding resolution in the video decoder 154 with the resolution (low resolution) of the video stream of the TS data outputted from the tuner 120b for low resolutions again. Thereby, the video decoder 154 performs decoding processing (decoding processing in the low resolution to the video stream of the program 2) in a low resolution.

**0036**In the state where the decoding output of the video stream of the channel of the program 1 of standard resolution is carried out by the operation more than Step S205:, When a channel change in the program 2 occurs in timing \*\*, during concerned timing \*\* to the timing \*\*, A channel change in the program 2 (image of the program 2 of a low resolution) in the tuner 120b for low resolutions, . The change to the output of the tuner 120b for low resolutions in the switch 130 and the change to the decoding processing of the low resolution in the video decoder 154 should do (Steps S201-S204). From timing \*\*, the decoding output of the video stream of the channel of the program 2 of a low resolution is carried out (Step S205). During the period of timing \*\* to timing \*\*, it is in the state where the decoding output of the video stream of the channel of the program 1 of standard resolution is carried out.

**0037**Step S206:, next the control section 140 are timing \*\*, and direct to choose the subcarrier (subcarrier including the image of the program 2 of standard resolution) of the program 2 to the tuner 120a for standard resolution. Thereby, the tuner 120a for standard resolution changes a receiving channel to the program 2.

**0038**If the state (state of timing \*\*) where the channel switching operation to the program 2 in the tuner 120a for standard resolution completes step S207:, next the control section 140, and the TS data can be outputted is checked, It directs to choose the output of the tuner 120a for standard resolution as output data to the switch 130. Thereby, the switch 130 changes the output of the tuner 120b for low resolutions selected as output data until now to the output of the tuner 120a for standard resolution.

**0039**Step S208: The control section 140 coincides the decoding resolution in the video decoder 154 with the resolution (standard resolution) of the video stream of the TS data outputted from the tuner 120a for standard resolution again. Thereby, the video decoder 154 performs decoding processing (decoding processing in the standard resolution to the video stream of the program 2) in standard resolution.

**0040**Channel switching operation in the tuner 120a for standard resolution is performed by the operation more than Step S209: in the state where the decoding output of the video stream of the channel of the program 2 of a low resolution from timing \*\* is carried out (Steps S206-S208). It is in the state where the decoding output of the video stream of the channel of the program 2 of a low resolution is carried out, as well as during this period. And if the channel switching operation in the tuner 120a for standard resolution is completed (timing \*\*), The change to the output of the tuner 120a for standard resolution in the switch 130 and the change to the decoding processing of the standard resolution in the video decoder 154 are made, and the decoding output of the video stream of the channel of the program 2 of standard resolution is carried out (Step S209).

**0041**Therefore, as shown in "(D) Decoding video signal" of drawing 3, in the former in the case of a channel change. To the freeze state (refer to "\*\*\*" in the said figure) of the output video signal having arisen, in this embodiment. Since it constituted so that broadcast reception of the image of a low resolution and its decoding output might be performed during the period until the channel switching operation is completed when the channel change occurred, as shown in "(D) Decoding video signal" of above-mentioned drawing 2, the freeze state of an output video signal is not generated.

**0042**It may be made to form the buffer 153 between the switch 130 and the demultiplexer 151 in the composition of the receiving set 100 shown in above-mentioned drawing 1.

**0043**The purpose of this invention the storage which memorized the program code of the software which realizes the host of this embodiment, and the function of a terminal, It cannot be overemphasized that it is attained, also when a system or a device is supplied and the computer (or CPU and MPU) of the system or a device reads and executes the program code stored in the storage. In this case, the program code itself read from the storage will realize the function of this embodiment, and the storage which memorized that program code will constitute this invention. As a storage for supplying a program code, ROM, a floppy (registered trademark) disk, a hard disk, an optical disc, a magneto-optical disc, CD-ROM, CD-R, magnetic tape, a nonvolatile memory card, etc. can be used. By executing the program code which the computer read, It cannot be overemphasized that it is contained also when the function of this embodiment is not only realized, but it performs a part or all of processing that OS etc. which are working on a computer are actual, based on directions of the program code and the function of this embodiment is realized by the processing. After the program code read from the storage was written in the memory with which the function expansion unit connected to the expanded-function board inserted in the computer or the computer is equipped, It cannot be overemphasized that it is contained also when a part or all of processing that CPU etc. with which the expansion board and function expansion unit are equipped are actual is performed based on directions of the program code and the function of this embodiment is realized by the processing.

#### **0044**

**Effect of the Invention**Since it constituted according to this invention so that it might change to the receive state of the period which the channel change completes, and the channel data which contains the picture image data of a low resolution temporarily when the channel change occurred as explained above, In television broadcasting compatible a receiving set or systems, such as BS digital broadcasting which adopted the hierarchy encoding system which is a method which transmits each image of standard resolution and a low resolution simultaneously with a modulation method different, respectively, The freeze state (Still Picture Sub-Division display) of the display image by which it is generated with a channel change is avoidable, it is smooth and comfortable channel switching control which does not have sense of incongruity in a display image can be realized.

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**Field of the Invention.** This invention is used for the device and system which receive digital television broadcast of the satellite broadcasting by BS (Broadcasting Satellite), etc., for example. It is related with the storage which stored the processing step for carrying a television

broadcasting receiving set, the Television Sub-Division broadcast receiving system, the Television Sub-Division broadcast receiving method, and it out so that read-out of a computer was possible.

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**Description of the Prior Art** Satellite digital broadcasting according on Japan in recent years, and from the end of 2000 to BS (Broadcasting Satellite). (It is only hereafter called "BS digital broadcasting") is due to be started, and adopting an MPEG 2 coding mode is determined as a coding mode used for this.

**0003** In BS digital broadcasting, the case where transmission C/N (Carrier to Noise Ratio: carrier-to-noise ratio) of the subcarrier of television broadcasting falls is assumed by a rainfall etc., The method (hierarchy encoding system) which transmits simultaneously the subcarrier which includes the image of standard resolution for the program of the same channel, and a subcarrier including the image of a low resolution with a modulation method different, respectively is examined. In this hierarchy encoding system, it is needless to say and a subcarrier including the image of a low resolution can be certainly transmitted in the state where transmission C/N fell more, rather than a subcarrier including the image of standard resolution.

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**Effect of the Invention** Since it constituted according to this invention so that it might change to the receive state of the period which the channel change completes, and the channel data which contains the picture image data of a low resolution temporarily when the channel change occurred as explained above, In television broadcasting compatible a receiving set or systems, such as BS digital broadcasting which adopted the hierarchy encoding system which is a method which transmits each image of standard resolution and a low resolution simultaneously with a modulation method different, respectively, The frieze state (Still Picture Sub-Division display) of the display image by which it is generated with a channel change is avoidable, it is smooth and comfortable channel switching control which does not have sense of incongruity in a display image can be realized.

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**Problem(s) to be Solved by the Invention** However, it was a problem that the frieze (stop) state of an output video signal which originates in the phenomenon called what is called channel hopping in the case of a channel change in the conventional receiving set corresponding to BS digital broadcasting etc. which were mentioned above arises. As main causes of channel hopping, in \*\* tuner switching operation, it takes time until the decoding operation of a tuner is stabilized.

\*\* MPEG 2 coding data is transmitted as packet data which are discontinuous in a time-axis and a space axis. \*\* is mentioned.

**0005** Although the frieze (stop) state of the output video signal resulting from the above channel hopping is a short time, it gives puzzlement to a user, and it spoils operativity.

**0006** Then, accomplished this invention in order to remove the above-mentioned fault, and the receiving set for digital television broadcast corresponding to the hierarchy encoding system which is a method which transmits each image of standard resolution and a low resolution simultaneously with a modulation method different, respectively, or the feature of a system is harnessed, The tuner for low resolution image reception which is not used in usual (setting to a comparatively good receive state) is used, By eliminating the time (\*\*) in connection with the switching operation and settling of a tuner of the main causes of channel hopping. Even if the frieze (stop) state of an output video signal is reduced and it is at the channel change time, It aims at providing the storage which stored the processing step for carrying out the television broadcasting receiving set, the Television Sub-Division broadcast receiving system, the Television Sub-Division broadcast receiving method, and it which can provide an image with little sense of incongruity for a user so that read-out of a computer was possible.

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**Means for Solving the Problem** This invention is characterized by that the bottom of this purpose comprises:

It is a television broadcasting receiving set which receives a subcarrier of television broadcasting which contains picture image data of the 1st resolution, and picture image data of the 2nd resolution at least in the same channel data, The 1st channel switching means that outputs data of arbitrary channels which change a receiving channel and contain picture image data of the 1st resolution of the above.

The 2nd channel switching means that outputs data of arbitrary channels which change a receiving channel and contain picture image data of the 2nd resolution of the above.

A selection output means which chooses any of each output of a channel switching means of the above 1st, and a channel switching means of the above 2nd they are, and is outputted.

A reproduction means which reproduces picture image data contained in data outputted from the above-mentioned selection output means based on resolution of the picture image data concerned, In the state where a receiving channel in a channel switching means of the above 1st is the 1st channel, and an output of a channel switching means of the above 1st is chosen in the above-mentioned selection output means. When a channel change to a receive state of the 2nd channel of the 1st channel of the above in a channel switching means of the above 1st from a receive state occurs, A control means as which make the 2nd channel of the above receive to a channel switching means of the above 2nd during the period until the channel change concerned is completed, and an output of a channel switching means of the above 2nd is made to choose to the above-mentioned selection output means.

**0008** In the 1st above-mentioned invention, the 2nd invention the above-mentioned control means, After the completion of a channel change of the above 2nd by a channel switching means of the above 2nd, A channel change to the 2nd channel of the above is made to perform to a channel switching means of the above 1st, and an output of a channel switching means of the above 1st is made to choose to the above-mentioned selection output means after the completion of a channel change concerned.

**0009** In the 3rd invention, in the 1st above-mentioned invention, the 1st resolution of the above contains standard resolution, and the 2nd resolution of the above contains a low resolution.

**0010** The 4th invention is each picture image data in which standard resolution differs the same channel from a low resolution, And with a modulation method different, respectively, are a television broadcasting receiving set corresponding to reception of digital television broadcast sent out simultaneously, and it chooses and restores to a subcarrier of arbitrary channels, The 1st tuner that outputs channel data containing picture image data of the above-mentioned standard resolution, The 2nd tuner that outputs channel data which chooses and restores to a subcarrier of arbitrary channels, and contains picture image data of the above-mentioned low resolution, A switch which chooses alternatively output data of the 1st tuner of the above, and output data of the 2nd tuner of the above, A decoder section which decodes picture image data contained in data selected with the above-mentioned switch according to resolution of the picture image data concerned, When a channel change to a receive state of the 2nd channel of the 1st channel in the 1st tuner of the above from a receive state occurs, The 2nd tuner of the above performs selection and a recovery of the 2nd of a channel, choose an output of the 2nd tuner of the above with the above-mentioned switch, and decoding resolution in the above-mentioned decoder section is set to resolution of picture image data of data outputted from the 2nd tuner of the above, The 1st tuner of the above performs selection and a recovery of the 2nd of a channel, an output of the 1st tuner of the above is chosen with the above-mentioned switch, and it has a control means which returns decoding resolution in the above-mentioned decoder section to resolution of picture image data of data outputted from the 1st tuner of the above.

**0011** In the above 1st or an invention of 4, as for the 5th invention, the above-mentioned channel data contains data according to an MPEG coding method.

**0012** The 6th invention is the Television Sub-Division broadcast receiving system to which it comes to connect two or more apparatus of each other so that communication is possible, and, as for at least one apparatus, it has a function of the television broadcasting receiving set according to any one of claims 1 to 5 among two or more above-mentioned apparatus.

**0013** The 7th invention receives a subcarrier of television broadcasting which contains picture image data of the 1st resolution, and picture image data of the 2nd resolution at least in the same channel data, Are a processing step which reproduces the receiving channel data

concerned the Television Sub-Division broadcast receiving method to include, and the above-mentioned processing step, By the 1st channel change step that outputs data of arbitrary channels which change a receiving channel and contain picture image data of the 1st resolution of the above by the 1st channel switching means, and the 2nd channel switching means. By the 2nd channel change step that outputs data of arbitrary channels which change a receiving channel and contain picture image data of the 2nd resolution of the above, and a selection output means. A selected output step which chooses any of each output of a channel switching means of the above 1st, and a channel switching means of the above 2nd they are, and is outputted, Regeneration steps which reproduce picture image data contained in data in which a selected output is carried out by the above-mentioned selected output step based on resolution of the picture image data concerned, At least motion control of a channel switching means of the above 1st, a channel switching means of the above 2nd, and the above-mentioned selection output means including a control step to perform the above-mentioned control step, In the state where a receiving channel in a channel switching means of the above 1st is the 1st channel, and an output of a channel switching means of the above 1st is chosen in the above-mentioned selection output means. When a channel change to a receive state of the 2nd channel of the 1st channel of the above in a channel switching means of the above 1st from a receive state occurs, The 2nd channel of the above is received by a channel switching means of the above 2nd during the period until the channel change concerned is completed, and a step which chooses an output of a channel switching means of the above 2nd by the above-mentioned selection output means is included.

**0014**The 8th invention is **this invention** characterized by that the 7th above-mentioned invention comprises the following.

A step to which the above-mentioned control step performs a channel change to the 2nd channel of the above by a channel switching means of the above 2nd.

A step which chooses an output of a channel switching means of the above 2nd by the above-mentioned selection output means after the completion of a channel change of the above 2nd by a channel switching means of the above 2nd.

A step which performs a channel change to the 2nd channel of the above by a channel switching means of the above 1st.

A step which chooses an output of a channel switching means of the above 1st by the above-mentioned selection output means after the completion of a channel change of the above 2nd by a channel switching means of the above 1st.

**0015**In the 9th invention, in the 7th above-mentioned invention, the 1st resolution of the above contains standard resolution, and the 2nd resolution of the above contains a low resolution.

**0016**The 10th invention is each picture image data in which standard resolution differs the same channel from a low resolution, And digital television broadcast simultaneously sent out with a modulation method different, respectively receives, Are a processing step which reproduces the receiving channel data concerned the Television Sub-Division broadcast receiving method to include, and the above-mentioned processing step, With the 1st channel change step that outputs data of the channel concerned which chooses and restores to a subcarrier of arbitrary channels, and contains picture image data of the above-mentioned standard resolution with the 1st tuner, and the 2nd tuner. With the 2nd channel change step that outputs data of the channel concerned which chooses and restores to a subcarrier of arbitrary channels, and contains picture image data of the above-mentioned low resolution, and a switch. A selected output step which chooses alternatively output data of the 1st tuner of the above, and output data of the 2nd tuner of the above, and outputs them, Including a decoding step which decodes picture image data contained in data by which the selected output was carried out with the above-mentioned switch according to resolution of the picture image data concerned, further the above-mentioned processing step, As a processing step at the time of a channel change to a receive state of the 2nd channel of the 1st channel in the 1st tuner of the above from a receive state occurring. The 1st step that performs selection and a recovery of the 2nd of a channel with the 2nd tuner of the above, The 2nd step that chooses an output of the 2nd tuner of the above with the above-mentioned switch, The 3rd step that sets decoding resolution in the above-mentioned decoder section to resolution of picture image data of data outputted from the 2nd tuner of the above, The 4th step that performs selection and a recovery of the 2nd of a channel with the 1st tuner of the above, The 5th step that chooses an output of the 1st tuner of the above with the above-mentioned switch, and the 6th step that returns



decoding resolution in the above-mentioned decoder section to resolution of picture image data of data outputted from the 1st tuner of the above are included.

**0017**In the above 7th or an invention of 10, as for the 11th invention, the above-mentioned receiving channel data contains data according to an MPEG coding method.

**0018**The 12th invention is characterized by being the storage which stored a processing program for carrying out a function of the television broadcasting receiving set according to any one of claims 1 to 5, or a function of the Television Sub-Division broadcast receiving system according to claim 6 so that read-out of a computer was possible.

**0019**The 13th invention is characterized by being the storage which stored a processing step of the Television Sub-Division broadcast receiving method according to any one of claims 7 to 11 so that read-out of a computer was possible.

**0020**When a channel change in the program 2 (the 2nd channel) from the program 1 (the 1st channel) specifically occurs by user's operation, In consideration of a dead time which selection (channel change) and decoding processing of a subcarrier by the 1st tuner for video-signal reception of standard resolution take, a video signal of a low resolution obtained by the 2nd tuner for video-signal reception of a low resolution is decoded and outputted during this period (display output). It enables this to eliminate a frieze (Still Picture Sub-Division display) state of a display screen generated at the time of a channel change. During a display period of this low resolution image, although display image quality deteriorates a little compared with what decoded and displayed a video signal of standard resolution, since there is no frieze (Still Picture Sub-Division display) of a screen, sense of incongruity like before accompanying channel switching control is reduced.

**0021**

**Embodiment of the Invention**Hereafter, an embodiment of the invention is described using Drawings.

**0022**This invention is applied to the receiving set 100 for digital television broadcast as shown in drawing 1, for example. This receiving set 100 is provided with the following.

A subcarrier including the image of standard resolution.

The antenna 110 for receiving the Television Sub-Division broadcasting electric-wave, as it is a receiving set corresponding to BS digital broadcasting etc. which adopted the method (hierarchy encoding system) which transmits simultaneously a subcarrier including the image of a low resolution with a modulation method different, respectively and is shown in above-mentioned drawing 1.

The tuners 120a and 120b which change the reception radio wave in the antenna 110 (channel change), and output the stream data of a reception radio wave.

The switch 130 which carries out a selection change alternatively and outputs each output data of the tuners 120a and 120b, the decoder 150 which acquires an audio signal and a video signal from the output data of the switch 130, and is outputted, and the control section 140 which manages the motion control of the this device 100 whole.

**0023**The <operation outline of receiving set 100> control section 140 performs motion control of the this device 100 whole with the microcontroller (CPU: not shown) of the inside. For example, the control section 140 is reading the processing program beforehand memorized by the internal memory by CPU, and executing it, and performs motion control of the this device 100 whole. Thereby, the receiving set 100 operates as follows.

**0024**The tuner 120a from two or more reception radio waves (subcarrier) supplied via the antenna 110. One arbitrary waves including the image of standard resolution are chosen, and the selection subcarrier is decoded to TS (Transport Stream) data in the MPEG 2 coding mode containing two or more program streams. On the other hand, the tuner 120b from two or more reception radio waves (subcarrier) supplied via the antenna 110. One arbitrary waves including the image of a low resolution are chosen, and the selection subcarrier is decoded to TS (Transport Stream) data in the MPEG 2 coding mode containing two or more program streams.

**0025**The TS data in the MPEG 2 coding mode with which the switch 130 was supplied from the tuner 120a (tuner for standard resolution) according to the control from the control section 140, And a selection change is carried out alternatively and the TS data in the MPEG 2 coding mode supplied from the tuner 120b (tuner for low resolutions) are outputted.

**0026**The decoder 150 is a decoder section corresponding to an MPEG 2 coding mode, and decodes arbitrary program streams out of two or more program streams contained in the TS data outputted from the switch 130.

**0027**Specifically, the decoder 150 is provided with the demultiplexer 151, the decoding base



clock regenerating section 152, the buffer (FIFO) 153, the video decoder 154, and the audio decoder 155.

**0028**According to the control from the control section 140, the demultiplexer (separation part) 151, Out of two or more program streams contained in the TS data from the switch 130. The program stream containing specific PID (Packet Identification: stream identification information) is acquired, Two or more PES (Packetized Elementary Stream) packets and packet headers which constitute the program stream concerned are filtered, A video packet, an audio packet, SI (Service Information), And information, including PCR (Program Clock Peference: program time reference value), SCR (System Clock Peference: system time standard reference value), etc., is acquired. And the demultiplexer 151 passes through a video packet video decoder 154 via the buffer 153, and information, including PCR, SCR, etc., is supplied to the decoding base clock regenerating section 152, and it supplies SI information for an audio packet to the control section 140 to the audio decoder 155, respectively.

**0029**The video decoder 154 decodes the video packet (video stream) accumulated temporarily to the video signal (video signal) of baseband, and outputs it to the buffer 153. The audio decoder 155 decodes the audio packet (audio stream) from the demultiplexer 151 to the audio signal (audio signal) of baseband, and outputs it.

**0030**The decoding base clock regenerating section 152 from information, including PCR from the demultiplexer 151, SCR, etc. A 27-MHz reference clock required for decoding of a video stream and an audio stream is generated, and the reference clock is supplied to the video decoder 154 and the audio decoder 155, respectively. Therefore, the video decoder 154 and the audio decoder 155 decode a video stream and an audio stream according to the reference clock from the decoding base clock regenerating section 152, respectively.

**0031**The interface for the signal reception from the remote control device (remote control) with which the control section 140 is operated from a user, It has LED etc. for a channel display and control for the channel selection by the above-mentioned remote control operation etc. and switching operation, etc. are performed based on the SI information from the demultiplexer 151.

**0032**<Operation of receiving set 100 by which it is characterized most> drawing 2, . It can set at the time of the channel change in the program 2 in the receiving set 100 from the program 1. The channel switching operation in the tuner 120a for standard resolution and the tuner 120b for low resolutions, the switching operation of the output data in the switch 130, and the switching operation of the decoding resolution in the video decoder 154 are shown typically. Operation shown in above-mentioned drawing 2 is carried out as follows by the motion control of the control section 140.

**0033**Step S201, S202 : When a channel change (change in the program 2 from a program) occurs in timing \*\* (Step S201), first by the remote control operation from a user etc. which were mentioned above by this timing \*\*. The control section 140 directs to choose the subcarrier (subcarrier including the image of the program 2 of a low resolution) of the program 2 to the tuner 120b for low resolutions (Step S202). Thereby, the tuner 120b for low resolutions changes a receiving channel to the program 2.

**0034**If the state (state of timing \*\*) where the channel switching operation to the program 2 in the tuner 120b for low resolutions completes step S203:, next the control section 140, and the TS data can be outputted is checked, It directs to choose the output of the tuner 120b for low resolutions as output data to the switch 130. Thereby, the switch 130 changes the output of the tuner 120a for standard resolution selected as output data until now to the output of the tuner 120b for low resolutions.

**0035**Step S204: The control section 140 coincides the decoding resolution in the video decoder 154 with the resolution (low resolution) of the video stream of the TS data outputted from the tuner 120b for low resolutions again. Thereby, the video decoder 154 performs decoding processing (decoding processing in the low resolution to the video stream of the program 2) in a low resolution.

**0036**In the state where the decoding output of the video stream of the channel of the program 1 of standard resolution is carried out by the operation more than Step S205:, When a channel change in the program 2 occurs in timing \*\*, during concerned timing \*\* to the timing \*\*, A channel change in the program 2 (image of the program 2 of a low resolution) in the tuner 120b for low resolutions, . The change to the output of the tuner 120b for low resolutions in the switch 130 and the change to the decoding processing of the low resolution in the video decoder 154 should do (Steps S201-S204). From timing \*\*, the decoding output of the video stream of the channel of the program 2 of a low resolution is carried out (Step S205). During

the period of timing \*\* to timing \*\*, it is in the state where the decoding output of the video stream of the channel of the program 1 of standard resolution is carried out.

**0037**Step S206:, next the control section 140 are timing \*\*, and direct to choose the subcarrier (subcarrier including the image of the program 2 of standard resolution) of the program 2 to the tuner 120a for standard resolution. Thereby, the tuner 120a for standard resolution changes a receiving channel to the program 2.

**0038**If the state (state of timing \*\*) where the channel switching operation to the program 2 in the tuner 120a for standard resolution completes step S207:, next the control section 140, and the TS data can be outputted is checked, It directs to choose the output of the tuner 120a for standard resolution as output data to the switch 130. Thereby, the switch 130 changes the output of the tuner 120b for low resolutions selected as output data until now to the output of the tuner 120a for standard resolution.

**0039**Step S208: The control section 140 coincides the decoding resolution in the video decoder 154 with the resolution (standard resolution) of the video stream of the TS data outputted from the tuner 120a for standard resolution again. Thereby, the video decoder 154 performs decoding processing (decoding processing in the standard resolution to the video stream of the program 2) in standard resolution.

**0040**Channel switching operation in the tuner 120a for standard resolution is performed by the operation more than Step S209: in the state where the decoding output of the video stream of the channel of the program 2 of a low resolution from timing \*\* is carried out (Steps S206-S208). It is in the state where the decoding output of the video stream of the channel of the program 2 of a low resolution is carried out, as well as during this period. And if the channel switching operation in the tuner 120a for standard resolution is completed (timing \*\*), The change to the output of the tuner 120a for standard resolution in the switch 130 and the change to the decoding processing of the standard resolution in the video decoder 154 are made, and the decoding output of the video stream of the channel of the program 2 of standard resolution is carried out (Step S209).

**0041**Therefore, as shown in "(D) Decoding video signal" of drawing 3, in the former in the case of a channel change. To the frieze state (refer to "\*" in the said figure) of the output video signal having arisen, in this embodiment. Since it constituted so that broadcast reception of the image of a low resolution and its decoding output might be performed during the period until the channel switching operation is completed when the channel change occurred, as shown in "(D) Decoding video signal" of above-mentioned drawing 2, the frieze state of an output video signal is not generated.

**0042**It may be made to form the buffer 153 between the switch 130 and the demultiplexer 151 in the composition of the receiving set 100 shown in above-mentioned drawing 1.

**0043**The purpose of this invention the storage which memorized the program code of the software which realizes the host of this embodiment, and the function of a terminal, It cannot be overemphasized that it is attained, also when a system or a device is supplied and the computer (or CPU and MPU) of the system or a device reads and executes the program code stored in the storage. In this case, the program code itself read from the storage will realize the function of this embodiment, and the storage which memorized that program code will constitute this invention. As a storage for supplying a program code, ROM, a floppy (registered trademark) disk, a hard disk, an optical disc, a magneto-optical disc, CD-ROM, CD-R, magnetic tape, a nonvolatile memory card, etc. can be used. By executing the program code which the computer read, It cannot be overemphasized that it is contained also when the function of this embodiment is not only realized, but it performs a part or all of processing that OS etc. which are working on a computer are actual, based on directions of the program code and the function of this embodiment is realized by the processing. After the program code read from the storage was written in the memory with which the function expansion unit connected to the expanded-function board inserted in the computer or the computer is equipped, It cannot be overemphasized that it is contained also when a part or all of processing that CPU etc. with which the expansion board and function expansion unit are equipped are actual is performed based on directions of the program code and the function of this embodiment is realized by the processing.

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#### **Brief Description of the Drawings**

**Drawing 1**It is a block diagram showing the composition of the receiving set of the digital

television broadcast which applied this invention.

**Drawing 2** It is a flow chart for explaining operation of the above-mentioned receiving set.

**Drawing 3** It is a figure for explaining the above-mentioned conventional channel switching action.

**Description of Notations**

100 Receiving set

110 Antenna

120a The tuner for standard resolution

120b The tuner for low resolutions

130 Switch

140 System control part

150 MPEG2 decoder part

151 Demultiplexer

152 \*\*\*\*\* 1 SUKUROKKU regenerating section

153 Buffer memory

154 BIDEODE coater

155 Audio decoder

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**Drawing 1**

For drawings please refer to the original document.

**Drawing 2**

For drawings please refer to the original document.

**Drawing 3**

For drawings please refer to the original document.

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For drawings please refer to the original document.

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